AQUALUNG®

SERVICE MANUAL

SECOND STAGE
Calypso / Titan

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REV. 03/04

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INTRODUCTION

This manual gives the instructions and the recommendations for the disassembly, the cleaning, the checking, the reassembly and the adjustment of an Aqualung regulator.
This manual is not an instruction manual for unqualified personnel. The procedures described in this manual are intended only for qualified personnel who have been trained in the servicing of Aqualung equipment during a specialised course.
If you do not understand certain procedures in this manual you should contact an Aqualung service consultant before undertaking any operation.

WARNINGS, ATTENTION, NOTES

Certain icons have been used to facilitate the reading and understanding of this manual. They have the following meanings :

WARNING: Indicates situations that could result in serious or fatal accidents if the advice given is not followed correctly.

ATTENTION: Indicates a situation or action that could cause serious damage to the product, making it dangerous if the advice given is not followed correctly.

NOTE : Notes are used to emphasize important points as well as information which needs to be remembered.

MAINTENANCE

Attention: Whatever the number of dives carried out during a year, the regulator should receive a complete service each year. If the regulator is used in a chlorinated or aggressive environment the service period should be reduced to six months.

In order to conform with the Aqualung Regulator Lifetime Guarantee, all servicing (inspection, servicing and repairs) should be recorded in the Service Record incorporated in the regulator User Manual.

GENERAL INSTRUCTIONS

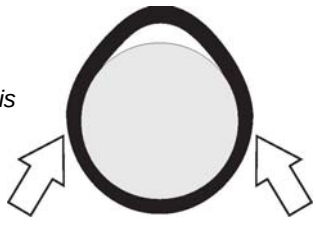
1. In order to carry out the procedures described in this manual correctly it is important that you follow the steps in the exact order indicated. Read the manual through completely so that you become familiar with all the procedures, the special tools and the replacement parts, before starting to disassemble the product. Keep this manual open near to you so that you can refer to it step by step. Do not rely on your memory..
2. All servicing and repair procedures should be carried out in a workshop that is clean, well lit, easy to access and specially fitted for the purpose.
3. The regulator body should never be directly held in the jaws of a vice. To hold the body, screw the tool 006230 into the HP port and then grip the tool with the vice.
4. Once the regulator has been disassembled, the re-usable components should be separated from the components that need to be replaced. Fragile items with seats or crowns with critical sealing surfaces should be separated and protected during servicing in order to prevent any damage.
5. Use only spare parts from Aqualung service kits. Never replace an Aqualung part with one from another manufacturer, even if it appears similar.
6. Never re-use regulator parts which should be replaced on the pretext that the regulator has seen little use since its manufacture or since its last service.
7. When reassembling, check that the torque used conforms with that shown in Table 4, Torque. Some parts can be irretrievably damaged if the acceptable torque is exceeded.

GENERAL CONVENTIONS

The conventions described below define the actions to be carried out when an instruction is given.

1. **Unscrew**: to unscrew a threaded part, turn it anti-clockwise.
2. **Screw**: to screw a threaded part, turn it clockwise.
3. **Remove the O-ring**: To remove an O-ring follow the method below, using the special tool provided for this purpose. Any tool that could damage the O-ring should be avoided. In every case, replace the O-ring removed with a new one.

Press simultaneously on the two sides of the O-ring in order to form an 'eye'. . Insert the special tool into this eye to remove the O-ring.



4. The acronyms used:
   LP: Low Pressure
   MP: Medium Pressure
   HP: High Pressure

5. Numbers in brackets indicate the part number of the component shown on the exploded view attached.

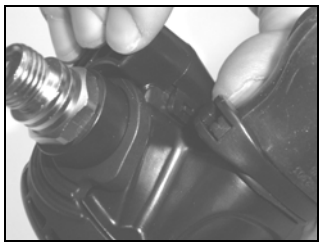
DISASSEMBLY PROCEDURE

***Note**: Before commencing disassembly, consult the exploded view to check the reference numbers of all parts requiring replacement. These parts should all be replaced by new parts and should not be re-used on the pretext that the regulator has seen little use since its manufacture or since its last service.*

***Attention**: Use only the special tool when removing O-rings in order to avoid damaging the seal recess. The slightest scratch on a sealing surface could cause a leak. If a surface should be damaged then this part should be replaced with a new one. Do not use any pointed instrument or metal tool to remove O-rings.*

1. Use a 11/16'' spanner and a 19mm spanner, block the nut (22) and unscrew the end nut on the hose. Remove the O-ring from the hose nipple. Take care not to damage the O-ring groove. Remove the O-ring from the hose threaded end

2. Slide back the hose protectors and check that there are no signs of impact and that the crimped ends are in good condition and that they firmly grip the hose. If not, it should be replaced.

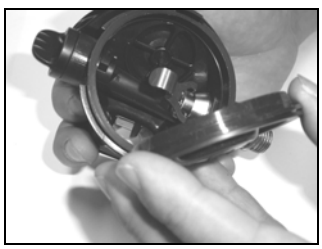


3. Remove the mouthpiece strap (2), by lifting the cam with your thumb.

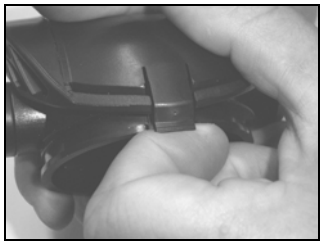
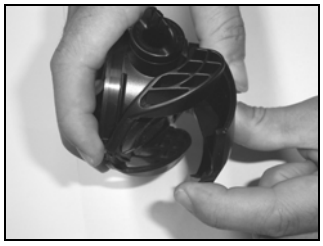
Remove the mouthpiece (3).

4. Remove the cover, starting from the venturi knob side.

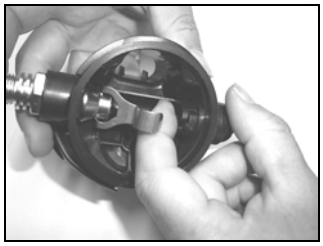
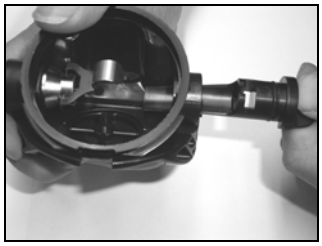
5. Remove the diaphragm (9) with its washer (10).

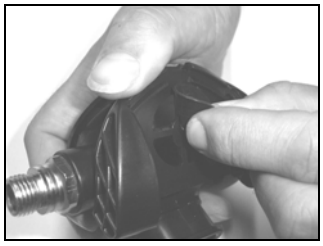


6. Remove the valve cover (5) by lifting the central tongue.

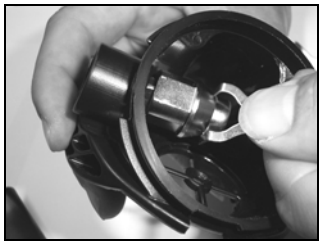
7. Remove the venturi clip (8), then the venturi knob (6)

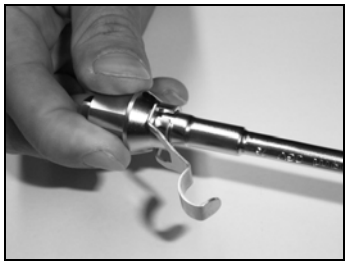





8. Lift the exhaust valve (4) and check that its surface is clean and free of scratches. It should be flexible and its edges should be clean. If it is in good condition it is not necessary to remove it and it can be re-used. If there are any signs of deterioration it should be replaced.

9. Use a 19 mm spanner to unscrew the crown holder (22), then remove the insert assembly (15)



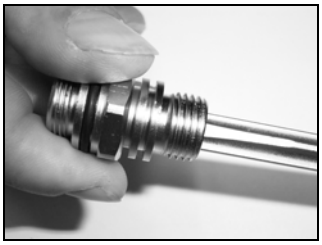
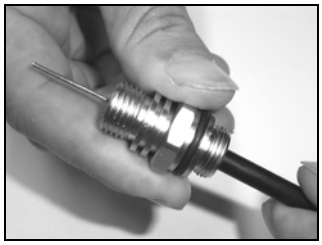


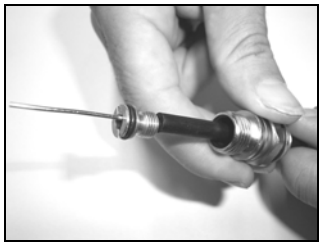
10. Unscrew the Nylstop nut (12). To disassemble the crown holder, spring, washer and lever.

11. Extract the square poppet bearing (16) by pushing it out with the crown holder if necessary.

12. Remove the silicone crown from the crown holder.

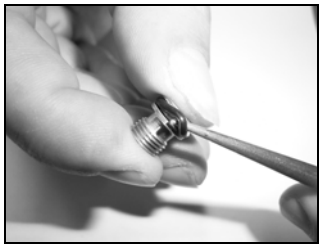
Keep the worn crown - it may be useful during reassembly.



13. Unscrew the seat, then use tool 116236 to extract the seat support.

14. Remove the two O-rings from the seat support.

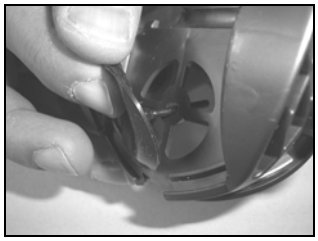


END OF DISASSEMBLY

Before starting to re-assemble the regulator, make sure that all replacement parts have been cleaned and lubricated in accordance with *Procedure A : Cleaning and Lubricating* on page 13.

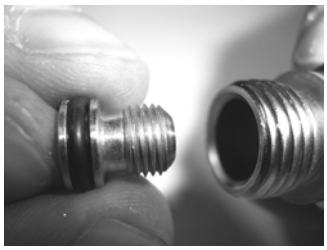
RE-ASSEMBLY PROCEDURE

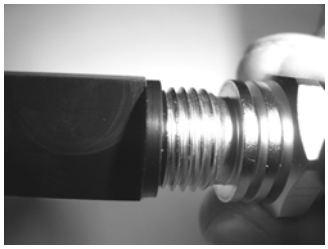
1. If the exhaust valve has been removed, pass the valve tail through the hole in the casing from the outside and pull gently until the notch is inside the casing. If it is a new valve cut off any excess tail leaving about 5mm.



2. Fit a new O-ring (7) into the groove on the venturi knob (6) and in the groove on the crown holder (22).

3. Fit the O-ring (20) onto the seat (21)





4. Insert the seat(21) into the crown holder (22). Use tool 125727 to screw the seat fully home against the crown holder.

5. Fit a new seat into the crown holder.

6. Fit a new square poppet (16) using the crown holder (18); then fit the spring (17) into the insert (15), then the poppet (18).

7. Fit the seat into the crown holder. This is to avoid damaging the new crown. Screw the crown holder assembly onto the insert (15) fitted with the poppet.

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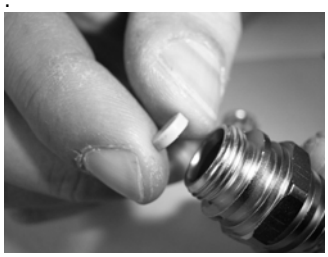
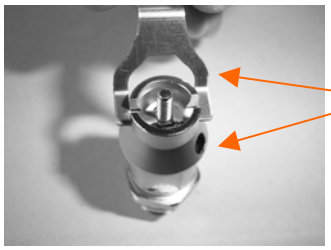
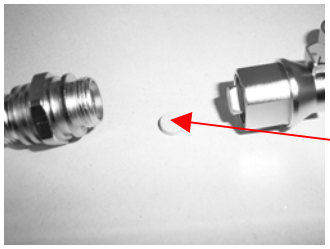




8. Fit the lever (14).

The lever should be opposite the injection hole.

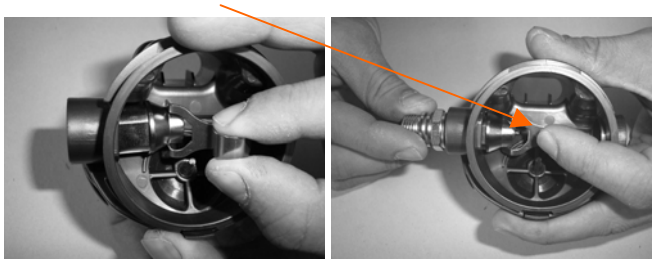
9. Fit the washer (13), then the Nylstop nut (12). Screw it in until 1 or 2 threads are visible.



10. Unscrew the crown holder (22) from the insert.

Remove the used seat and discard it..

11. Fit the lever/insert assembly into the casing (1). Screw the crown holder (22) fully home, while pressing on the lever (14).



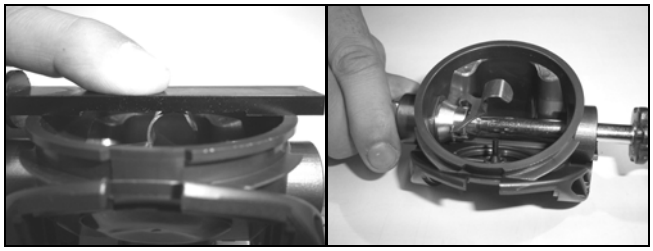
12. Use a 19mm torque wrench to tighten the crown holder at 1 m.kg

13. Fit a new lubricated O-ring on the threaded end of the hose. Fit a new lubricated O-ring on the hose nipple.

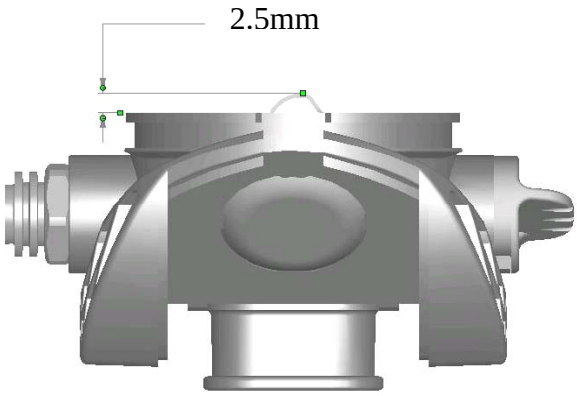
14. Lever height adjustment

Fit the MP hose to the second stage. Connect the assembly to a first stage giving an MP=9.5 ±0.5 bar. Put the regulator under pressure

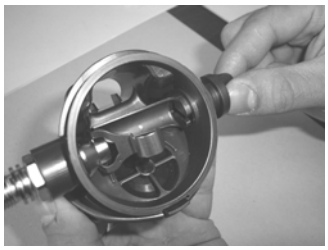
Slide the wedge of the adjusting tool 125727 across the top of the casing. The lever should touch the wedge without provoking a leak. The end of the lever should then be 2.5mm above the edge of the casing.

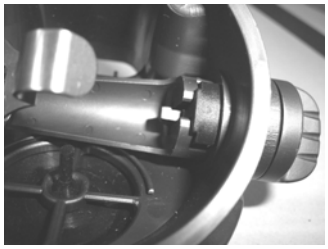


If the second stage leaks under the wedge: Unscrew the Nylstop nut,
If the lever is not touching the wedge: screw the Nylstop nut back in until the lever attains the correct height.



When the adjustment has been made, turn off the air supply and purge the regulator. Remove the hose.

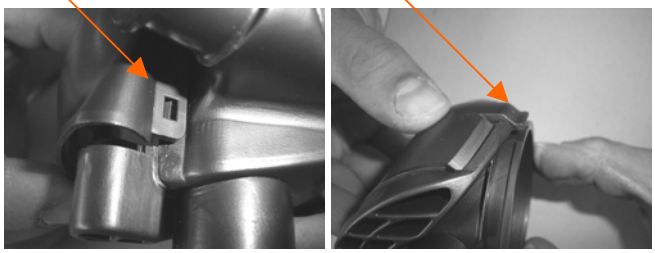




15. Fit the venturi knob (6) with its O-ring (7), Lock the knob in place by inserting the venturi retainer (8).
You should hear a “click” as it locks.

16 . Fit the valve cover (5) :

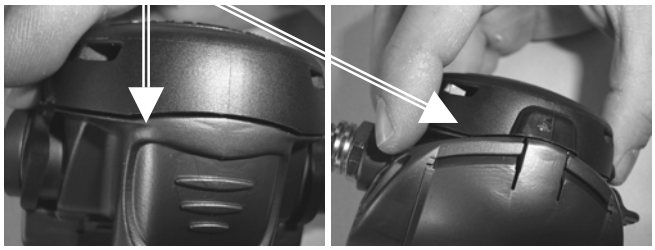
Position the two lugs on the casing in the 2 square holes on the cover, then clip the tongue in place.



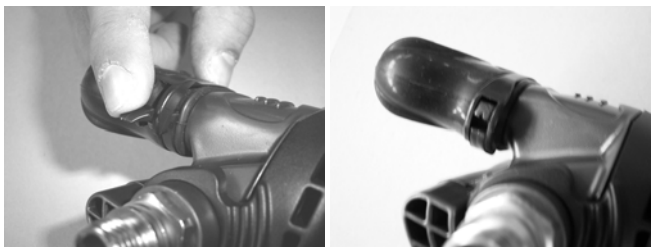
17. Fit the washer (10) onto the diaphragm (11) and place the assembly into the casing.

18. Fit the cover onto the casing, starting from the hose side.

19. Check that the cover is correctly fitted to the casing.



Fit the mouthpiece (3), then the mouthpiece strap (2)



Refit and tighten the MP hose using a 11/16 spanner.

FINAL CHECKS

1. Put the regulator under pressure with a 200 bar (±10 bar) supply.

***Note**: Tests 2,3 and 4 require the use of a Regulator Test bench.*

2. *Opening effort check*. Apply an increasing inhalation flow. When the MP starts to fall, note the effort reading and compare it with the limits shown on ***Table 5. Checking specifications*.**

2.1 If the opening effort is too low, disassemble the second stage to gain access to the lever : follow steps 4 to 7. Screw in the adjustable seat (21) 1/2 turn using a screwdriver.
Readjust the lever height, see step 14, then reassemble the second stage from step 15 to the end.

2.2 If the opening effort is too high, , disassemble the second stage to gain access to the lever : follow steps 4 to 7. Unscrew the adjustable seat (21) 1/2 turn using a screwdriver.

Do not unscrew the adjustable seat more than a half turn, relative to the adjustment made using tool 125727 in step 4.

Readjust the lever height, see step 14, then reassemble the second stage from step 15 to the end.

3.Flow/effort test . Apply an inhalation flow of 400 l/min and check that the effort does not exceed 15 mbar. If the effort exceeds this then check ***Table 1. Troubleshooting Guide.***

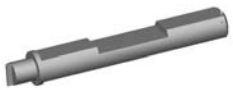
4.Leak test. Connect the first stage to a cylinder charged to 200 bar, open the cylinder valve and immerse the set in a fresh water bath for one minute. Check that there are no leaks. If a leak is detected, disassemble the entire 2nd stage; check all sealing surfaces and the correct positioning of all parts.

END OF REASSEMBLY

Table 1. Troubleshooting Guide

SYMPTOM	POSSIBLE CAUSE	TREATMENT
Leak or free flow at 2nd stage	1. MP too high	1. Refer to First stage Troubleshooting Guide
	2. The valve (19) is worn or damaged.	2. Replace the valve
	3. The seat (21) is not correctly adjusted	3. Readjust the seat
	4. The lever (14) is bent	4. Replace the lever
	5. The sealing face of the seat (21) is damaged.	5. Replace the seat
	6. The lever (14) adjustment is too high	6. Unscrew the Nylstop screw (12)
	7. The spring (17) is damaged	7. Replace the spring
Insufficient purge flow or work of breathing too high	1. MP too low	1. 1. Refer to First stage Troubleshooting Guide
	2. The lever adjustment is too low	2. Readjust the lever and the valve
	3. MP hose obstructed	3. Clean or replace the hose
	4. Le lever (14) is bent	4. Replace the lever
Water leak in second stage during inhalation	1. Hole in mouthpiece (3)	1. Replace the mouthpiece
	2. Diaphragm (9) damaged	2. Replace the diaphragm
	3. Exhalation valve (4) damaged	3. Replace the valve
	5. The diaphragm (9) is not correctly fitted between the casing (1) and the washer (10)	4. Disassemble the cover and refit the assembly correctly
	6. The casing is damaged.	5. Check the sealing face of the exhalation valve. Replace the casing
	7. The O-ring (7) is damaged.	7. Replace the O-ring

Table 2. List of Tools

REF	DESCRIPTION	APPLICATION	US PART NO.
116222	MP pressure gauge complete 0/16B	Checking medium pressure	111610
125727	 Seat/lever adjustment tool	Adjusting seat (21) and lever (14)	125727
116236		Seat assembly/disassembly	109436
116239		Nylstop nut (12)	N/a
N/C	Torque wrench 1 m.kg	Crown holder (22)	N/a
N/C	Medium flat screwdriver	Adjusting seat (21)	N/a
N/C	O-ring tool	Fitting and removing O-rings	944022

128004	**Second Stage service kit**	**Second stage Calypso/Titan Octopus ABS**	

Table 3. Recommended cleaners and lubricants

LUBRICANT / CLEANER	APPLICATION	SOURCE
Cristo-Lube MCG 111	All O-rings	Aqualung, ref. 480025
	***Attention**: Silicone parts do not require lubrication. Do not grease them. Greasing silicone parts can change their molecular construction and cause premature degradation of the material.*	
Oakite #31	Acid bath for cleaning brass and stainless steel parts.	Oakite Products, Inc.
NETALU	Acid bath for cleaning brass and stainless steel parts.	Aqualung, ref. 455001
Diluted white vinegar	Acid bath for cleaning brass and stainless steel parts.	Household stores
	***Attention**: Do not use hydrochloric acid for cleaning parts. Hydrochloric acid, even when well diluted, attacks the coating of metal parts and leaves a corrosive deposit that damages plastic parts and O-rings.*	
Washing-up liquid (diluted with hot water)	Degreases brass and stainless steel parts; general cleaning of plastic and rubber parts.	Household stores

Procedure A
Cleaning and Lubricating
(All Aqualung Regulators)

Cleaning brass and stainless steel parts.

1. Pre-clean by soaking in NETALU diluted to 25%.
2. Cleaning in an ultra-sonic bath filled with a mixture of washing-up liquid + hot water. If some resistant deposits remain then fill the ultrasonic bath with white vinegar and repeat. DO NOT put plastic, rubber, silicone or anodised aluminium parts in contact with vinegar.
3. Rinse in demineralised or fresh water to avoid calcium deposits. Soak for 10 minutes. Dry with filtered low pressure air and then check that their condition is now suitable for re-use.

Cleaning plastic, rubber and anodised aluminium parts.

For anodised aluminium parts: soak in a « NETALU diluted to 25% ». Rinse in fresh water and dry with low-pressure filtered air.
For plastic parts. (casings, plugs..) : clean in an ultrasonic bath containing a mixture of washing-up liquid and hot water. Use only a toothbrush with nylon bristles to remove any deposits. Rinse in fresh water and dry with low-pressure filtered air

***Attention**: D not place plastic and rubber parts in contact with acid solutions. This could alter their physical properties and cause degradation and premature breakdown.*

Cleaning parts for Nitrox/O2 use.

1. Metal parts : Pre-clean by soaking in NETALU diluted to 25%.
2. Ultrasonic cleaning in Promoclean TP108 diluted at 5% .
3. Rinse in demineralised water. Soak for 10 min.
4. Dry in the open air in a clean and dust-free atmosphere. Place the parts on a white cloth, allow to dry and check after drying that the cloth shows no grease deposits and that the condition of the parts is appropriate for re-use with Nitrox/O2.

Cleaning hoses.

If there is significant corrosion then it is permissible to soak only the ends in an ultrasonic bath, avoiding any possibility of the solution entering the hose. Rinse in fresh water and allow to dry with the connections hanging down. Dry the inside with filtered compressed air before reconnecting the hose to the regulator.

Wiping.

To wipe parts, use a white filter paper, a pure cotton cloth or any other material that **does not produce fluff.**

Inspection.

Visually check under a white light (day light or artificial light).
The parts are completely free of any traces of :

1. organic materials (oil, grease, paint, rust…)
2. cleaning agents
3. dust
4. humidity

Lubrication.

When handling O-rings wear unpowdered latex gloves. It is important not to allow contact between the internal components and the skin or any other source of contamination when the regulator is being prepared for Nitrox use. All seals should be lubricated with Cristolube MCG111. Cover the seals with a light film of grease and remove any excess by rolling the seal between finger and thumb. Do not use an excess of grease, this can have the effect of accumulating particles which could damage the O-rings.

Table 4. Torque values

N° REFERENCE	DESCRIPTION	FORCE
124506	Crown holder (22)	1 m.kg.

Table 5. Checking specifications

TEST	CONSIGNES	SPECIFICATIONS
Leak Test	MP = 9.5 ±0.5 bar	No leak
Opening effort	MP = 9.5 ±0.5 bar	Calypso between **2.5 mbar** and **4 mbar** Octopus between **2.8 mbar** and **4.3 mbar**
Effort / Flow	**MP at 9.5 bar ± 0.5**	15 mbar maxi at 400 L/min

Maintenance Notes.

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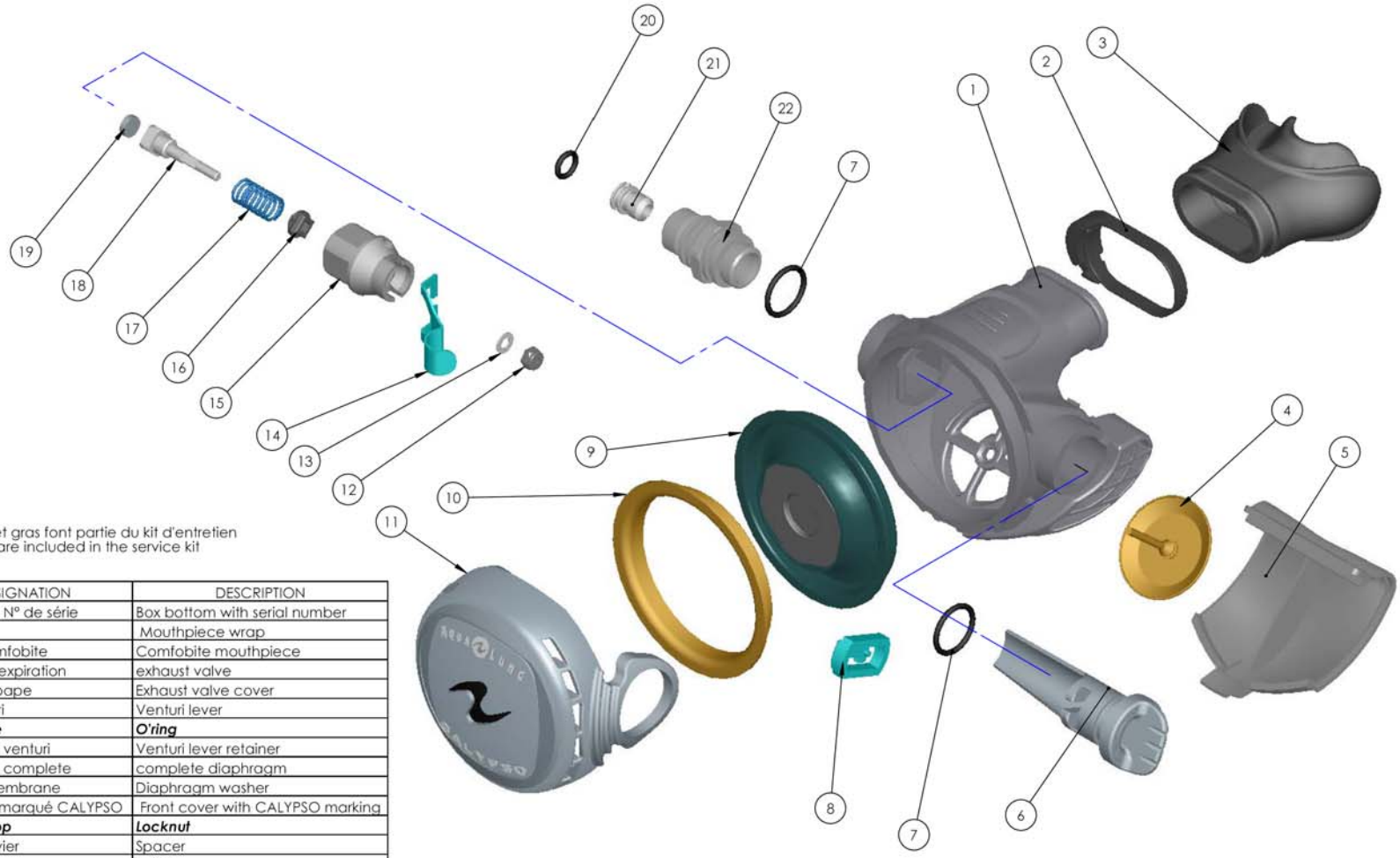

Les références en italiques et gras font partie du kit d'entretien
Part numbers in bold italics are included in the service kit

No	QTE	REF.	DESIGNATION	DESCRIPTION
1	1	125721	Boitier avec N° de série	Box bottom with serial number
2	1	129154	Clip	Mouthpiece wrap
3	1	123697	Embout comfobite	Comfobite mouthpiece
4	1	129174	Soupape d'expiration	exhaust valve
5	1	125702	Cache soupape	Exhaust valve cover
6	1	125706	Volet venturi	Venturi lever
7	2	***124706***	***Joint torique***	***O'ring***
8	1	125707	verrou volet venturi	Venturi lever retainer
9	1	125705	Membrane complete	complete diaphragm
10	1	124509	Rondelle membrane	Diaphragm washer
11	1	125719	Couvercle marqué CALYPSO	Front cover with CALYPSO marking
12	1	***A02510***	***Ecrou Nylstop***	***Locknut***
13	1	124515	Rondelle levier	Spacer
14	1	125708	Levier	Lever
15	1	125709	Insert	Insert
16	1	***124551***	***Palier carré***	***square poppet bearing***
17	1	124511	Ressort BP	LP spring
18	1	124510	Porte clapet	Poppet
19	1	***116611***	***Clapet BP***	***LP seat***
20	1	***444243***	***Joint torique 1.78 x 6.07***	***O-ring 1.78 x 6.07***
21	1	124259	Siège réglable	Adjustable crown
22	1	124506	Porte siège	Crown holder

N°	Date Modif	Ind		
			Désignation	BP Calypso
			Description	Calypso 2nd stage
			Notice	- - - - - -
			Date	01/07/03

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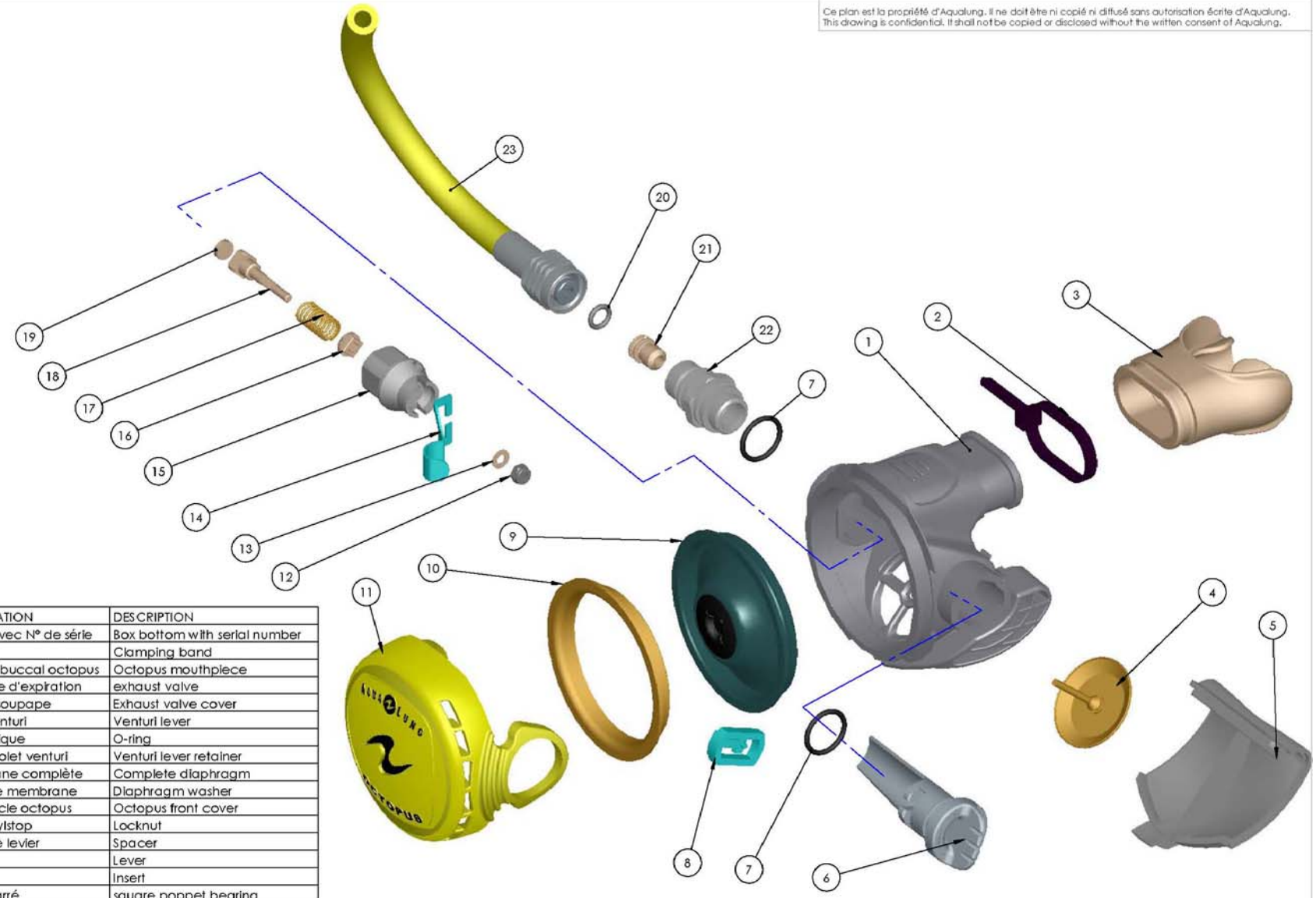

No	QTE	No.PIÈCE	DESIGNATION	DESCRIPTION
1	1	125721	Boîtier avec N° de série	Box bottom with serial number
2	1	113648	Collier	Clamping band
3	1	123698	Embout buccal octopus	Octopus mouthpiece
4	1	129174	Soupape d'expiration	exhaust valve
5	1	125702	Cache soupape	Exhaust valve cover
6	1	125706	Volet venturi	Venturi lever
7	2	124706	Joint torique	O-ring
8	1	125707	verrou volet venturi	Venturi lever retainer
9	1	125705	Membrane complète	Complete diaphragm
10	1	124509	Rondelle membrane	Diaphragm washer
11	1	125724	Couvercle octopus	Octopus front cover
12	1	A02510	Ecrou Nylstop	Locknut
13	1	124515	Rondelle levier	Spacer
14	1	125708	Levier	Lever
15	1	125709	Insert	Insert
16	1	124551	Palier carré	square poppet bearing
17	1	124511	Ressort BP	LP spring
18	1	124510	Porte clapet	Poppet
19	1	116611	Clapet BP	LP seat
20	1	444243	Bague	O-ring
21	1	124259	Siège réglable	Adjustable crown
22	1	124506	Porte siège	Crown holder
23	1	124566	Flexible 3/8 Jaune	Yellow hose

N°	Date Modif	Ind		
			Désignation	Octopus Calypso/Titan
			Description	Calypso/Titan Octopus 2nd stage
			Notice	------
			Date	01/07/03

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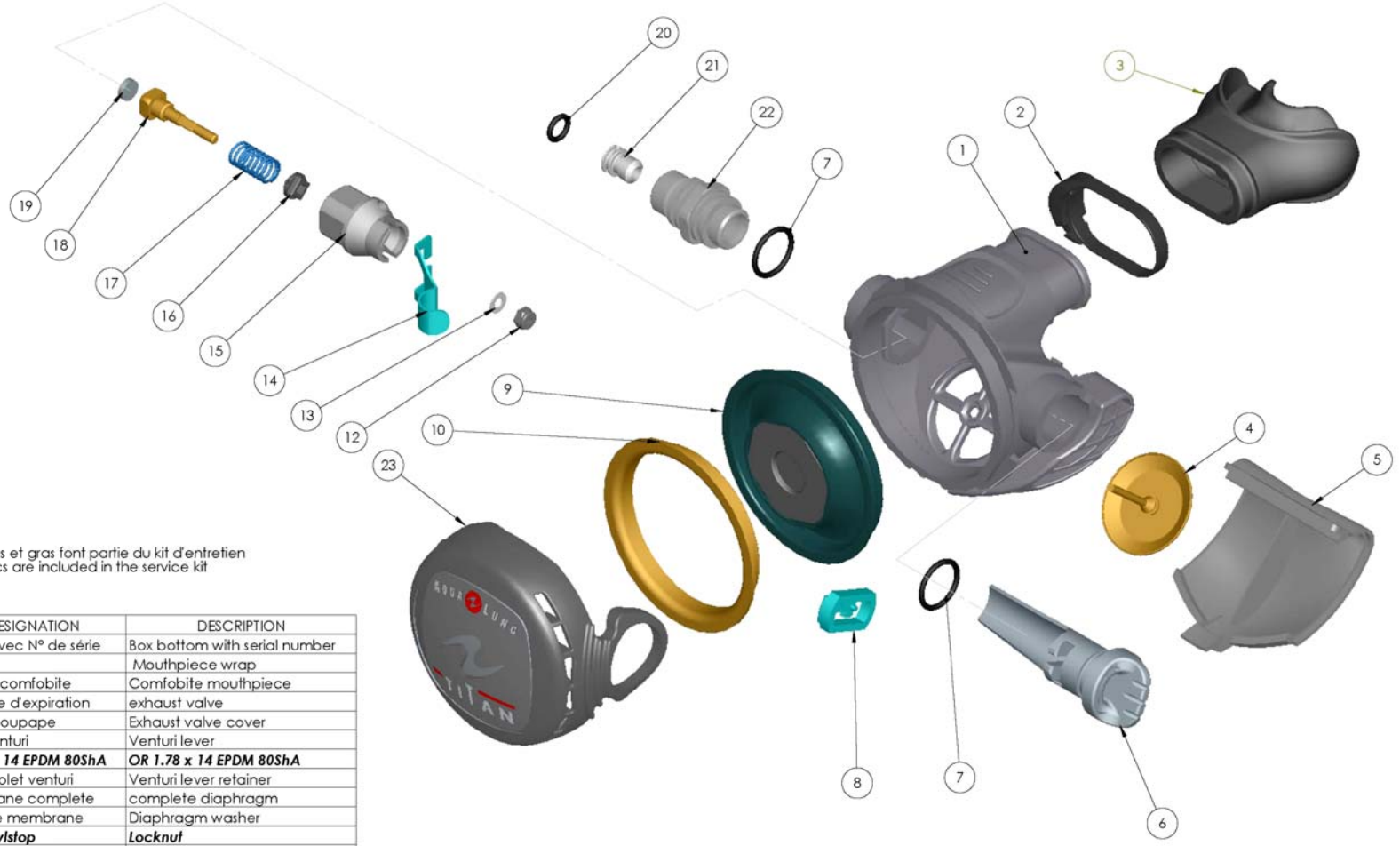

Les références en italiques et gras font partie du kit d'entretien
Part numbers in bold italics are included in the service kit

No	QTE	No.PIÈCE	DESIGNATION	DESCRIPTION
1	1	125721	Boitier avec N° de série	Box bottom with serial number
2	1	129154	Clip	Mouthpiece wrap
3	1	123697	Embout comfobite	Comfobite mouthpiece
4	1	129174	Soupape d'expiration	exhaust valve
5	1	125702	Cache soupape	Exhaust valve cover
6	1	125706	Volet venturi	Venturi lever
7	***2***	***124706***	***JT 1.78 x 14 EPDM 80ShA***	***OR 1.78 x 14 EPDM 80ShA***
8	1	125707	verrou volet venturi	Venturi lever retainer
9	1	125705	Membrane complete	complete diaphragm
10	1	124509	Rondelle membrane	Diaphragm washer
12	***1***	***A02510***	***Ecrou Nylstop***	***Locknut***
13	1	124515	Rondelle levier	Spacer
14	1	125708	Levier	Lever
15	1	125709	Insert	Insert
16	***1***	***124551***	***Palier carré***	***square poppet bearing***
17	1	124511	Ressort BP	LP spring
18	1	124510	Porte clapet	poppet
19	***1***	***116611***	***Clapet BP***	***LP seat***
20	***1***	***444243***	***JT 1.78x6.07 EPDM 80ShA***	***OR 1.78x6.07 EPDM 80ShA***
21	1	124259	Siège réglable	Adjustable crown
22	1	124506	Porte siège	Crown holder
23	1	125732	Couvercle TItan marqué	Titan cover with marking

			Désignation	BP Titan
			Description	Titan 2nd stage
			Notice	- - - - - -
1376	02/05	A	Date	01/07/03
N°	Date Modif	Ind		

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